



Subject :-Syllabus for the post of Executive Engineer (Civil), Assistant Executive Engineer (Civil), Executive Engineer (Electrical), Assistant Executive Engineer (Electrical), Assistant Transportation Engineer, Senior Planner, Economist and Assistant Law Officer

Reference:- Advertisement published dated 12.04.2023 with respect to subject posts

1. Executive Engineer (Civil) and Assistant Executive Engineer (Civil):-

Sr. No.	Syllabus
1.	<p><u>Strength of materials & Theory of Structures, Structural analysis, Design of RCC & Steel Structures:-</u></p> <p>Stresses, strains, principal stresses, bending moments, shear forces and torsion theory, bending theory of beam, deflection of beam, theories of buckling of columns, Analysis of beams, frames and trusses, slope deflection method, moment distribution method. Analysis of arches and suspension cables, influence lines, stiffness and flexibility matrix methods. Plastic Analysis, Design of bolted and welded connections, columns, footings, trusses, steel beams, plate girders. Computer-aided analysis and design of structures, application of computer programming to structures. numerical methods such as:</p> <ul style="list-style-type: none">i. Finding area by Simpson's rule, trapezoidal rule;ii. Finding root of an equation by<ul style="list-style-type: none">a) Newton-Raphson techniquesb) Bisection methodiii. Solution of simultaneous equations by<ul style="list-style-type: none">a) Gauss elimination methodb) Gauss Jordan method,c) Iteration method. <p>Design of Reinforced concrete Structures (WSM and Limit State) Design of slab, beams, columns, footing, Foundations, Retaining walls, tanks, building frames, staircases.</p>
2.	<u>Construction Planning and Contract Management:</u>

	<p>Functions of management, Elements of material management, safety engineering, CPM, PERT network analysis, construction equipment, site layout, quality control, agreement, PPP investment models, EPC, various Labour Acts related to Construction workers and industry (workmen compensation Act, Factories Act, Minimum wages Act, etc.), New Labour Codes, Insurances (CAR Policy, EC Policy, etc.), RERA Act</p>
3.	<p><u>Bridge Engineering:</u></p> <p>Selection of site, types of bridges, discharge, waterway, spans, afflux, Scour, standards, specifications, loads and forces, erection of superstructure, strengthening cofferdams, caissons.</p>
4.	<p><u>Concrete Technology:</u></p> <p>Properties of wet and hardened concrete, test on concrete, factors affecting concrete, water cement ratio, aggregate cement ratio, mix design, additives, design of form work, types of form work.</p>
5.	<p><u>Prestressed concrete:</u></p> <p>Principles of pre-stressing, materials used and their properties, permissible stresses as per I.S. codes, systems of pre-stressing, losses in pre-stress, design of pre-tensioned and post-tensioned beams- simply supported, rectangular and T- beams, cable profile, end block design, bridge girder.</p>
6.	<p><u>Geotechnical Engineering:</u></p> <p>Geotechnical properties, stresses in soil, shear resistance, compaction, consolidation and earth pressure, stability of slopes, bearing capacity, settlements, shallow and deep foundations, basic engineering geology.</p>
7.	<p><u>Surveying:</u></p> <p>Classification of surveys, measurement of distances-direct and indirect methods, optical and electronic devices, prismatic compass, local attraction; plane table surveying, levelling, volume calculation, contours, theodolite, theodolite traversing, omitted measurements, trigonometric levelling, tachometry, Curves, photogrammetry, geodetic surveying, hydrographic surveying, advanced instruments in surveying, Dron Survey.</p>
8.	<p><u>Engineering Materials:</u></p> <p>Properties of wet and hardened concrete, tests on concrete, factors affecting strength of concrete, water-cement ratio, aggregate-cement ratio, mix design, additives, design of form work, types of form work, bitumen, mastic asphalt, emulsion, cutback, stone matrix asphalt, fly ash, sustainable building materials, stones, bricks, cement, lime, mortar, timber, plastic, concrete, steel, paints and varnishes.</p>
	<p><u>Building Planning and Construction</u></p>

9.	Principles of building planning and design, integrated approach, building byelaws, building services such as vertical transportation, water supply sanitation, thermal ventilation, lighting, acoustics, fire protection, electrical fittings. Types of foundations, stones, brick and block masonry, steel and reinforced cement concrete structures, floors, doors and windows, roofs, finishing works, water proofing.
10.	<p><u>Engineering hydrology & Fluid Mechanics:</u></p> <p>Hydrological cycle, precipitation, evaporation, infiltration, runoff, hydrographs, reservoir planning & sediment control, floods, flood routing, ground water, Hydraulics, Properties of fluids, fluid statics and buoyancy, kinematics and dynamics, flow measurement, flow in open channel, flow in closed conduits, dimensional and model analysis, losses in pipe flow, cavitation's and separation, siphon, water hammer, boundary layer and control, pipe network. Hydraulic turbines, centrifugal pumps, reciprocating pumps, power house, classification and layout.</p>
11.	<p><u>Irrigation Engineering:</u></p> <p>Water requirement of crops, methods of irrigation, lift irrigation, water logging, dams, spillways, energy dissipation, diversion head works, canal and canal structures, cross drainage works, river training works, lake tapping.</p>
12.	<p><u>Roads & Highway Engineering:</u></p> <p>Planning of highway systems, alignment and geometric design, horizontal and vertical curves, grade separation, cross sectional elements of highway, thin and ultra-thin white topping, overlays, rigid and flexible pavement, traffic engineering.</p>
13.	<p><u>Tunnel Engineering:</u></p> <p>Surveys, criteria for selection of size and shapes, driving in soft and hard grounds, mucking, dust control, ventilation, lighting and drainage, special methods of tunneling, cut and cover method, TBM, NATM, tunnel lining, Irrigation and highway tunneling, metro tunneling.</p>
14.	<p><u>Estimation, costing ,valuation and Tendering:</u></p> <p>Specification, estimation, costing, tenders and contracts, rate analysis, valuation, Claims, Arbitration, Conciliation, Dispute Settlement, CVC tender/contract Guidelines</p>
	<u>Environmental Engineering:</u>

15.	<p><u>Water supply Engineering</u> Sources of supply, design of intakes, estimation of demand, water quality standards, primary and secondary treatment, maintenance of treatment units, conveyance and distribution of treated water, rural water supply.</p> <p><u>Wastewater Engineering and Pollution Control</u> Quantity, collection and conveyance and quality, disposal, design of sewer and sewerage systems, pumping, characteristics of sewage and its treatment, rural sanitation, sources and effects of air and noise pollution, monitoring, standards. Recycling and Reuse of treated sewage water.</p> <p><u>Solid waste management & Waste to Energy</u> Sources, classification, collection, treatment and disposal. Waste to Energy.</p>
16.	<u>Metro, Railway, Horticulture & Airport Engineering</u>

2. Executive Engineer (Electrical) and Assistant Executive Engineer (Electrical):-

Sr.No.	Syllabus
1	<p>Circuit Analysis:</p> <p>DC circuit elements, ideal current and voltage sources, work power energy calculations, Work power energy calculations in AC series and parallel circuits,.</p>
2	<p>Electric field and Materials:</p> <p>Gauss Law, electric field and potential due to point, line, plane and spherical charge distributions, Electric dipoles and systems of charges. Ampere's and Biot-Savart s laws; inductance, dielectrics, capacitance; Maxwells equations. Characteristics and applications of materials for electrical systems, crystal structures and defects, ceramic materials, insulating materials, semiconducting materials photoelectric materials, superconducting materials.</p>
3	<p>Magnetic field and Materials:</p> <p>Magnetic field, magnetic circuits. Energy stored in electric and magnetic fields, electromagnetic induction, BH curve. Magnetic materials ferrites, Ferro-magnetic materials; Basics of Nano materials. Maxwells equations for time varying fields. Electromagnetic waves.</p>
4	<p>Transformers and DC machines:</p> <p>Transformers-principles and performance of Single phase and three phase transformers; three phase transformers connections, parallel operation, auto-transformer, energy conversion principles. DC Machines- Principles, performance and applications of DC generators and Motors, types, characteristics, armature reaction and commutation, starting and speed control of motors;, Principles and performance.</p>
5	<p>AC Machines:</p> <p>AC Machines- Principles, performance characteristics of single phase and three phase induction motors; Synchronous machines - performance, regulation, parallel operation of generators, motor starting. Applications. Special Machines- Servo Motors, Stepper motors, BLDC and PMSM motors-Characteristics and applications. Linear motors.</p>
6	<p>Power and Energy Systems :</p> <p>Concept of power generation, types of turbines, transmission line models and performance, Calculation of sag and tension in transmission of lines, cable performance, insulation, corona and radio interference, power factor correction, principles of protection systems, basics of solid-state relays and digital protection; Circuit breakers, LT and HT switchgear, Radial and ring-main distribution systems.</p>
7	<p>Power System Analysis:</p> <p>Power system Analysis-symmetrical components, fault analysis, load flow analysis. Power system Operation and Control-voltage control and economic operation, stability analysis, Swing curves and equal area criterion. Concepts of power system dynamics.</p>

8	<p>Recent Trends in Power and Energy Systems:</p> <p>Energy scenario in India and Maharashtra, energy policies, energy pricing, smart energy meters, renewable energy systems, distributed generation, energy storage systems, batteries, fuel cells and super capacitors; Energy systems for hybrid and electric vehicles. Smart Grid systems, Solar Energy.</p>
9	<p>Illumination:</p> <p>Basic terms in lighting systems and features, lamp types and their features, Recommended illumination levels for various tasks, methodology of lighting system energy efficiency study, Illumination system design for residential, commercial, industrial categories. Solar powered illumination and associated economics.</p>
10	<p>DG set and UPS :</p> <p>DG set selection and installation factors, Operational features, Energy performance assessment of DG sets, Energy saving majors for DG sets, Synchronization of DGs with utility Supply. Parallel operation. UPS technology, types and specifications, Performance assessment.</p>
11	<p>Utilization :</p> <p>ump types and characteristics, Pump curves, Factors affecting pump performance, Efficient pumping system operation, and Energy conservation in pumping systems. Fan and Compressor types, Fan and compressor performance evaluation and efficient system operation, Compressor capacity assessment, Energy saving opportunities in fans and Compressors.</p>
12	<p>Control and Instrumention Systems Analysis :</p> <p>Open loop and closed loop control system, transfer function, block diagrams and signal flow graphs representation and simplification, steady-state errors, Routh-Hurwitz criterion, Nyquist techniques, Bode plots, root loci. transient and frequency response analysis, ammeter, voltmeter, kwhmeter, wattmeter, PFmeter.</p>
13	<p>Control Systems Design :</p> <p>Lag, lead and lead-lag compensation, Classical PID and industrial controllers, tuning of PID Controllers, stability analysis, state space representation, state transition matrix, controllability and observability, linear state variable feedback controller, Luenberger observer.</p>

3. Assistant Transportation Engineer:-

Sr. No.	Subject	Details
1	Transportation Infrastructure	Planning and design of urban roads and highways including cross sectional elements sight distances, horizontal and vertical alignment and other elements such as safety, set backs etc.
		Geometric design of railway track – Speed and Cant., Basic alignment and design concepts of Metro, Metro-Neo, LRT systems.
		Basics of Airport Planning, Concept of airport runway orientation, length calculations and corrections design of runway, taxiway and exit taxiway.
2	Pavement Design	Highway materials - desirable properties and tests, Desirable properties of bituminous paving mixes. Design factors for flexible and rigid pavements; Design of flexible and rigid pavement using IRC Codes, Perpetual pavement, pavement management System, Design of White topping and innovative technologies in Pavement Design.
3	Traffic Engineering & Transport Economics	Traffic studies on flow and speed, peak hour factor, accident study etc. Traffic Projections Analysis
		Statistical analysis of traffic data, parking management
		Microscopic and macroscopic parameters of traffic flow, fundamental relationships, Utility Management as per IRC
		Traffic signs, Signal design by Webster's method, Types of intersections; Highway capacity etc. Elements of Intelligent transportation Systems.
		Transport Economics, Benefit - Cost, NPV, IRR analysis etc. Project structuring -EPC/PPP
4	Transportation Systems	Different Types of Transportation Systems, Metro Rail, Mono Rail, System Capacity, Basic Knowledge of Comprehensive Mobility Plan Preparation and DPR preparation of Metro/Highway/ Airport Project.
5	Current and Basic knowledge and transportation Projects	Basic Knowledge of Statutory clearances required for transportation Projects. Various Government initiatives like PM Gatishakti, Sagarmala and Bharatmala, Civil Aviation Policies Updates on New Technology used in ongoing Metro, Airport, Highway projects, MoHUA guidelines etc.
6	Softwares used in transportation Projects	Basic Knowledge of AutoCAD, MX/OPEN ROADS, EMME & other software used for geometric design and Transport Modelling.

4. Economist:-

Sr.No.	Syllabus
1	Micro Economics Demand and Supply analysis, small business research, production input and output analysis, market demand etc.
2	Macro Economics Union and state Budget analysis, Open economy, functions of financial institutions, Macro Economics model for infrastructure etc.
3	Statistics for Economics Data interpretation, forecasting, statistics models for economics analysis, econometrics, hypothesis test, programming languages for statics tools etc.
4	Urban Economics Urban development cause study, urban land market, Central Business Development units, Educational institutions, ULBs Economics etc.
5	Development Economics Modern theories of development, Environmental concerns, sustainable development strategy, growth models
6	Public Economics Government role in market, Economic policy ULBs, Government, PSUs etc. public expenditure, taxation, fiscal and monetary policy etc.
7	Financial Economics Financial planning institution, government finance, land valuation, capital market, systems of financial market, role of RBI
8	Public Policy CIDCO economics policy, urban development policy, public finance, urban development policy, public sector undertaking policy
9	Transportation Economics Urban transport development, Metro connectivity, role of local train, Public transportation model, PPP Model for transportation
10	Economics Development of Maharashtra Regional urban Development strategy, economics growth, budget, economics survey, urban agglomeration, PSUs growth model

5. Senior Planner:-

Sr. No.	Subject	Details
1	Theories of Planning	1.Garden City Concept, Geddiian Trio Concept, Concentric zone model, Sector Theory, Multi-nuclei theory, Neighborhood Concept 2.Central Place Theory by Christaller and Losch
2	Urbanisation, Govt. Schemes and Missions	1.Atal Mission for Rejuvenation and Urban Transformation, Shyam Prasad Mukherjee Rurban Mission, Pradhan Mantri Awas Yojna, Smart City 2.National Urban Information System, National Natural Resources Management System, India Urban Observatory, Various schemes for financial assistance, to Municipal Councils under plan schemes
3	Policies in India and Maharashtra	National Urban Transport Policy, National Land- utilisation policy, National Housing Policy National Energy Policy, The Street Vendors Act,2014
4	Various Planning Authorities in Maharashtra	1.MMRDA, PMRDA, CIDCO, MSRDC, MADC, MIDC- Functions, roles and responsibilities, 2.projects carried out
5	Regional Plan	1.Need of Regional Plan, Delineation of Region , Types of Regions, Contents of Regional Plan, Surveys necessary for Regional Plan, Analysis and Projections, 2.Process of preparation of Regional Plan as per provisions of MR and TP Act, 1966, Relation with State Plan and surroundings, 3.National Capital Region 4.Role of Metropolitan Planning Committee, Hill Station Regulations
6	Development Plan	1.Difference between Structure Plan and Development Plan, 2.Classification of Towns, Surveys, Analysis and Projections, Demographic projections, 3.Public participation in DP, 4.Implementation and financial aspects, Relation with Regional Plan, Contents of D.P., Planning norms, Modifications to sanctioned DP, Modifications of substantial nature, Notices under section 49 and 127, Process of DP preparation, publication, submission and approval as per provisions of MR and TP Act 1966 5.GIS based Development Plans under AMRUT
7	Town Planning Scheme	1.Concept, Preparation of TP Scheme as per provisions of MR and TP Act, 1966, 2. Amendments in Act in 2014 with respect to TPS 3. TPS Rules 4. Relation with DP, Original Plot, Final Plot, Semi-final plot, Incremental contribution, and rationale for charging it, Contents of TPS, Cost of TPS, Advance possession, 5.Functions of Arbitrator, Functions of Tribunal of Appeal

8	Local Area Plan	1. Concept, Objectives, Delineation of LAP boundary, Methodology of preparation, 2. Case studies in India, 3. Provision in UDCPR
9	Unified Development Control Regulations	1. Procedure for obtaining development permission/building permission, Grant/ refusal of permission, deemed permission, Approvals on risk based categorization, Commencement of works, General land development requirements, Land-Use Classification and equivalency of zones, concept of p-line, Ancillary FSI, TDR, AR, Reservation Credit Certificate, Removal of difficulties, Redevelopment of dilapidated/dangerous buildings, housing for EWS/ LIG, Incentive for green buildings , Off –street parking requirements, Affordable housing, Voluntary TP Schemes, Heritage list card, premiums and their payment, Integrated Township, Transit oriented development. 2. SRA 3. Urban Renewal Schemes 4. City Specific Regulations for CIDCO area
10	Development Charges and Appeals	1. Levy and assessment Development charges, 2. Applicability of development charges and its exemption 3. Revocation of permission, Provisions of appeal under section 47 and 126, Actions against unauthorized development
11	Implementation of Projects & Land Sharing	1. PPP models - BOT, BOO, BOOT, BOLT 2. Special Purpose vehicles 3. Land sharing modules, Plans for resettlement and rehabilitation
12	Transportation	1. Transportation Studies, Origin and Destination, traffic volume survey, modal split, transport System 2. Public transport, BRT, Metro/ Mono Rail, Intelligent Transport System and its applications 3. Comprehensive Mobility Plan, Urban Transport Planning Process
13	Environment	1. Environment Clearance, Environmental Impact Assessment. 2. Eco-sensitive zones, Sustainable development SDG goals related to spatial planning, Disaster resilient planning. CRZ Regulations
14	Acts and Rules	1. Maharashtra Regional Town Planning Act, 1966 and rules there under 2. Maharashtra Municipal Corporations Act, 1949 3. Maharashtra Municipal Councils, Nagar Panchayats and Industrial Townships Act, 1965 4. Maharashtra Land Revenue Code, 1966 5. Environment Protection Act, 1986 6. 73rd and 74th Constitutional Amendment Act 7. Maharashtra Metropolitan Planning Committees (Constitution and Functions) Act, 1999 and rules thereunder 8. Maharashtra Metropolitan Region Development Authority Act, 2016 9. Real Estate (Regulation and Development) Act, 2016

15	Land Acquisition	<ol style="list-style-type: none"> 1. Need of compulsory acquisition, 2. Functions of Land Acquisition officer 3. Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013, 4. Various other acts in Maharashtra for acquisition and method of estimating compensation under such Acts (MIDC Act, MHADA Act, Highways Act) 5. Land Acquisition model in CIDCO area
16	Development Models	<p>Entire development under public control (e.g. NTDA in Maharashtra, DDA in Delhi), various public private partnership in developing city (e.g. Gurgaon, Naya Raipur, New Kolkata) , traditional development on master plan /development plan where authority places reservations and realises the community facilities and amenities, TP scheme model and variants of land pooling land readjustment model where community facilities remain the responsibility of public authorities while it only controls the built space for other land uses.</p>

6. Assistant Law Officer:-

Sr. No.	Syllabus
1.	Constitution of India: Article 226 and 227 of the constitution of India. Fundamental Rights. Directive Principles of State Policy. Article 165. Advocate General of State Appointment of High Court Justice and Appointment of District Judges. Special Provision relating to certain classes – Article 330, 340, 341, 342. Amendment of the Constitution of India Article 368.
2.	Specific Relief Act 1963: Recovery of specific immovable property – Section-5. Contracts not specifically enforceable – Section – 14. Who may obtain specific performance instruments that may be rectified? Cases in which a specific performance contract is enforceable. recovery of specific immovable property. Preventive Relief flow granted
3.	The Indian Penal Code 1860: Right to the private defense of the body and or property. Definition of criminal conspiracy. Public Servant disobeying Law with intent to cause injury to any person. Public Servant unlawfully buying or bidding for the property. Illegal purchase or bid for property offered for sale by authority of public servant. Threat to injury to the public servant. Dishonest misappropriation of property. Criminal Breach of trust. Cheating. Criminal Trespass. Forgery Making False documents. Forgery for purpose of cheating.
4.	Civil Procedure Code
5.	Indian Evidence Act, 1872: Define Admission Evidence may be given of facts in issue and relevant facts Public documents and private documents. The burden of proof-whom burden proof lies Estoppel; Leading Question; When they must ask. When witness to be compelled to answer Procedure of Court in case of the question being asked without reasonable grounds Impeaching credit of witness Production of documents. Examination in chief; Cross-examination and Re-examination of witness. Difference between oral Evidence and Documentary Evidence.
6.	The Right to Fair Compensation and Transparency in Land Acquisition: Rehabilitation and Resettlement Act 2003: Determination of Social Impact and public purpose Preliminary survey of land and power of officers to carry out the survey. Payment of damages. Determination of amount of compensation Parameters to be considered by the collector in the determination of Award. What is a special provision to safeguard food security, Award of Collector when to be final
7.	The Environment (Protection) Act 1988: Powers of Central Government to take measures to protect and improve the environment
8.	Maharashtra Regional and Town Planning Act, 1966:
	1) Power of State Government to acquire land for Corporation or Company declared to be New Town Development Authority. 2) Power to make regulations.

	3) Special provisions relating to New Town Development Authority and Special Planning Authority.
	4) Notice to illegal Constructions
	5) Power to remove illegal Constructions
8.	Maharashtra Co-operative Housing Societies Act, 1960
	Labour Laws: -
9.	1) Workmen Compensation Act
	2) Maharashtra Recognition of Trade Union and Prevention of unfair Labour Practices,1971
	3) Payment of Wages Act,1936
	4) Employees State Insurance Act, 1948
10.	Protection of Human Rights Act,1993
11.	Consumer Protection Act,1986
12.	Indian Contract Act,1872
13.	Arbitration and Conciliation,1996
14.	Transfer of Property, 1882
15.	Company Act, 1956
16.	Stamp Act,1899
17.	Registration Act,1908

Manager (Personnel)
CIDCO Ltd.